



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,721	03/09/2004	Patrick M. Schweizer	107044-0045	1783
24267 7590 03/28/2008 CESARI AND MCKENNA, LLP 88 BLACK FALCON AVENUE BOSTON, MA 02210				
EXAMINER				
CHUO, TONY SHENG HSIANG				
ART UNIT		PAPER NUMBER		
1795				
MAIL DATE		DELIVERY MODE		
03/28/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/796,721

**Applicant(s)**

SCHWEIZER, PATRICK M.

**Examiner**

Tony Chuo

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 February 2008.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 3, 4 and 6-8 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1, 3, 4 and 6-8 is/are rejected.  
7) ☒ Claim(s) 1 is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 07 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/S508)  
Paper No(s)/Mail Date \_\_\_\_\_  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/8/08 has been entered.

### ***Response to Amendment***

2. Claims 1, 3, 4, and 6-8 are currently pending. Claims 2, 5, and 9-26 have been cancelled. The previous double patenting rejection of claims 1, 3, and 4 is withdrawn. The amended claims do overcome the previously stated 103 rejections. However, upon further consideration, claims 1, 3, 4, and 6-8 are rejected under the following new 103 rejections.

### ***Claim Objections***

3. Claim 1 is objected to because of the following informalities: in lines 6, 14, 15, 17, the word "movable" should be changed to "moving". Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1 and 3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites the limitations "said movable plate" in line 18 and "said receiving element" in line 13. There is insufficient antecedent basis for these limitations in the claim.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanizaki et al (JP 4-274174) in view of Strang (US 2003/0019580).

The Tanizaki reference discloses a shutter mechanism for controlling reactants in a direct methanol fuel cell system, having at least one fuel cell "1" including a membrane electrode assembly, comprising: a fuel source, an anode current collector "39" disposed generally at the anode reaction layer "33b", a cathode current collector "39" disposed generally at the cathode reaction layer "36b", shutter plate "7" disposed within the fuel cell between a source of a reactant and the membrane electrode

assembly, wherein the shutter plate has through-holes "6" that correspond with through-holes "8" on anode collector plate "10" such that when the shutter plate is placed adjacent to the anode collector plate, the flow of the reactant is controlled (See page 7, Working Example 1 and Figure 1). It also discloses a shutter plate that is placed between a fuel source and the anode catalyst layer "33b" (See Figures 1 and 5).

However, Tanizaki et al does not expressly teach a moving component having a plurality of laterally displaced protrusions, wherein the moving component is adjustable in a direction perpendicular to the plane in which the component is disposed, such that when it is adjusted, the component travels generally in a z-axis within a vapor gap, closer to or further away from an anode current collector, to control fuel flow while not consuming substantially additional volume within the fuel cell; and the anode current collector formed with a plurality of laterally displaced openings corresponding to the plurality of laterally displaced protrusions, such that when moving component is placed adjacent to the receiving element, the flow of the reactant is controlled, wherein the moving component is configured such that when the moving component is adjusted to a closed position, the protrusions interconnect with the openings in the anode current collection to substantially seal the openings, and the moving component also having apertures therein interspersed with the protrusions in such a manner that when the moving component is in a open position, the apertures allow for flow of fuel therethrough to the membrane electrode assembly.

The Strang reference discloses an apparatus that enables the adjustment of the mass flow rate through a plurality of bores comprising: a freely moving plug plate "154"

arranged parallel to and spaced apart from an inject plate "124", wherein the plug plate comprises a plurality of plugs (protrusions) "160" and a plurality of apertures "156" through which gas may pass that are interspersed with the plugs, wherein each plug extends into a respective bore (opening) "166" formed in the inject plate "124", and wherein the plug plate is adjustable in a direction perpendicular to the plane in which the plug plate is disposed via displacement actuators "170" (See paragraph [0053],[0055] and Figure 3(a)).

Examiner's note: It is inherent that when the plug plate is adjusted to a closed position, the plugs interconnect with the bore to substantially seal the bores and when the plug plate is adjusted in an open position, the apertures allow for the flow of gas therethrough. In addition, the Strang reference is relevant to the Tanizaki reference and the applicant's field of endeavor because it solves the same problem of controlling the flow of a gas through a plurality of openings.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Tanizaki shutter plate to include a moving component having a plurality of laterally displaced protrusions, wherein the moving component is adjustable in a direction perpendicular to the plane in which the component is disposed, such that when it is adjusted, the component travels generally in a z-axis within a vapor gap, closer to or further away from an anode current collector, to control fuel flow while not consuming substantially additional volume within the fuel cell; and the anode current collector formed with a plurality of laterally displaced openings corresponding to the plurality of laterally displaced protrusions, such that

when moving component is placed adjacent to the receiving element, the flow of the reactant is controlled, wherein the moving component is configured such that when the moving component is adjusted to a closed position, the protrusions interconnect with the openings in the anode current collection to substantially seal the openings, and the moving component also having apertures therein interspersed with the protrusions in such a manner that when the moving component is in an open position, the apertures allow for flow of fuel therethrough to the membrane electrode assembly in order to provide an uniform gas flow through the openings of an receiving component. In addition, the substitution of a known mechanism for controlling a gas flow for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

8. Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanizaki et al (JP 4-274174) in view of Guay (US 2005/0058879), and further in view of Strang (US 2003/0019580).

The Tanizaki reference discloses a shutter mechanism a direct methanol fuel cell system comprising: a fuel source and a fuel cell "1" that includes a proton conductive membrane "35" having reaction layers "33b" & "36b" on each of its major surfaces; an anode current collector "39" disposed generally at the anode reaction layer "33b"; a cathode current collector "39" disposed generally at the cathode reaction layer "36b"; a movable shutter plate "7" disposed within the fuel chamber "32" between a source of a reactant and the anode current collector such that when the movable shutter plate is adjustable to substantially or partially prevent fuel flow through the anode current

collector to the anode reaction layer of the fuel cell; and a load coupled between the anode current collector and the cathode current collector for utilizing the electricity generated by the fuel cell (See paragraphs [0002],[0005],[0016] and Figure 1 and 5).

However, Tanizaki et al does not expressly teach a passive mass transport barrier disposed generally between the fuel source and the anode aspect and spaced from the anode aspect to define a vapor gap in the fuel cell, wherein the passive mass transport barrier controls the rate of fuel delivery to the catalyzed anode aspect of the fuel cell. The Guay reference discloses an enhanced planar vaporization membrane "44" disposed in a vapor chamber between the fuel source and the anode catalyst layer of the fuel cell that controls the rate of fuel delivery to the anode catalyst layer of the fuel cell (See paragraphs [0060],[0061]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Tanizaki fuel cell system to include a passive mass transport barrier disposed generally between the fuel source and the anode aspect and spaced from the anode aspect to define a vapor gap in the fuel cell, wherein the passive mass transport barrier controls the rate of fuel delivery to the catalyzed anode aspect of the fuel cell in order to deliver vapor phase of methanol fuel at higher rates to enable higher power DMFC systems.

However, Tanizaki et al as modified by Guay does not expressly teach a movable shutter plate having a plurality of laterally displaced protrusions disposed within the vapor gap between the passive mass transport barrier and the anode current collector which forms a plurality of laterally displaced openings corresponding to the



plurality of laterally displaced protrusions, wherein when the movable plate is adjusted to a closed position, the protrusions interconnect with the openings in the anode current collector to substantially seal the openings, and the movable plate also having apertures therein interspersed with the protrusions in such a manner that when the movable plate is in an open position, the apertures allow for flow of fuel therethrough, wherein the movable plate is adjustable in a direction perpendicular to the plane in which the plate is disposed, such that when it is adjusted, the plate travels generally in a z-axis within the vapor gap, closer to or further away from the anode current collector, to control fuel flow while not consuming substantially additional volume within the fuel cell; and protrusions that have angled sides, wherein the openings in the anode current collector are correspondingly angled such that the protrusions interconnect securely within the angled openings of the current collector to substantially seal the openings against fuel flow.

The Strang reference discloses an apparatus that enables the adjustment of the mass flow rate through a plurality of bores comprising: a freely moving plug plate "154" arranged parallel to and spaced apart from an inject plate "124", wherein the plug plate comprises a plurality of plugs (protrusions) "160" and a plurality of apertures "156" through which gas may pass that are interspersed with the plugs, wherein each plug extends into a respective bore (opening) "166" formed in the inject plate "124", and wherein the plug plate is adjustable in a direction perpendicular to the plane in which the plug plate is disposed via displacement actuators "170" (See paragraph [0053],[0055] and Figure 3(a)). It also discloses plugs "160" with angled sides, wherein the bores

"166" are correspondingly angled such that the plugs interconnect securely within the angled bores to substantially seal the bores against gas flow (See Figure 3J).

Examiner's note: It is inherent that when the plug plate is adjusted to a closed position, the plugs interconnect with the bore to substantially seal the bores and when the plug plate is adjusted in an open position, the apertures allow for the flow of gas therethrough. In addition, the Strang reference is relevant to the Tanizaki reference and the applicant's field of endeavor because it solves the same problem of controlling the flow of a gas through a plurality of openings.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Tanizaki/Guay shutter plate to include a movable shutter plate having a plurality of laterally displaced protrusions disposed within the vapor gap between the passive mass transport barrier and the anode current collector which forms a plurality of laterally displaced openings corresponding to the plurality of laterally displaced protrusions, wherein when the movable plate is adjusted to a closed position, the protrusions interconnect with the openings in the anode current collector to substantially seal the openings, and the movable plate also having apertures therein interspersed with the protrusions in such a manner that when the movable plate is in an open position, the apertures allow for flow of fuel therethrough, wherein the movable plate is adjustable in a direction perpendicular to the plane in which the plate is disposed, such that when it is adjusted, the plate travels generally in a z-axis within the vapor gap, closer to or further away from the anode current collector, to control fuel flow while not consuming substantially additional volume within the fuel cell; and protrusions

that have angled sides, wherein the openings in the anode current collector are correspondingly angled such that the protrusions interconnect securely within the angled openings of the current collector to substantially seal the openings against fuel flow in order to provide an uniform gas flow through the openings of an receiving component. In addition, the substitution of a known mechanism for controlling a gas flow for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanizaki et al (JP 4-274174) in view of Guay (US 2005/0058879) and Strang (US 2003/0019580) as applied to claim 4 above, and further in view of Fukano et al (US 2003/0102032).

However, Tanizaki et al as modified by Guay and Strang does not expressly teach protrusions that are substantially comprised of a compliant material that is compressed into the openings when the movable plate is adjusted to a closed position. The Fukano reference discloses a valve plug "102 that is made of a flexible material such as a resin material or a rubber material that opens/closes the fluid passage by separating from a seat section "106" (See paragraphs [0046],[0047] and Figure 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Tanizaki/Guay/Strang fuel cell system to include protrusions that are substantially comprised of a compliant material that is compressed into the openings when the movable plate is adjusted to a closed position in order to utilize a material that forms a stronger seal around the openings when the movable plate is adjusted to a closed position.

Examiner's note: The Fukano reference is relevant to the Tanizaki reference, Guay reference, Strang reference, and the applicant's field of endeavor because it solves the same problem of controlling the flow of a fluid from an inlet to an outlet.

10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanizaki et al (JP 4-274174) in view of Guay (US 2005/0058879) and Strang (US 2003/0019580) as applied to claim 4 above, and further in view of Griffin (US 2003/0213519).

However, Tanizaki et al as modified by Guay and Strang does not expressly teach a coating disposed on the sides of the protrusions in the movable plate which further secures sealing of the anode current collector against fuel flow therethrough. The Griffin discloses a valve plug "148" that has a vulcanized rubber coating "148A" on the exterior of the valve plug (See paragraph [0055]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Tanizaki/Guay/Strang fuel cell system to include a coating disposed on the sides of the protrusions in the movable plate in order to provide a fluid-tight seal against the openings of the anode current collector.

Examiner's note: The Griffin reference is relevant to the Tanizaki reference, Guay reference, Strang reference, and the applicant's field of endeavor because it solves the same problem of controlling the flow of a fluid from an inlet to an outlet.

### ***Response to Arguments***

11. Applicant's arguments with respect to claims 1, 3, 4, and 6-8 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 7:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

/Jonathan Crepeau/  
Primary Examiner, Art Unit 1795